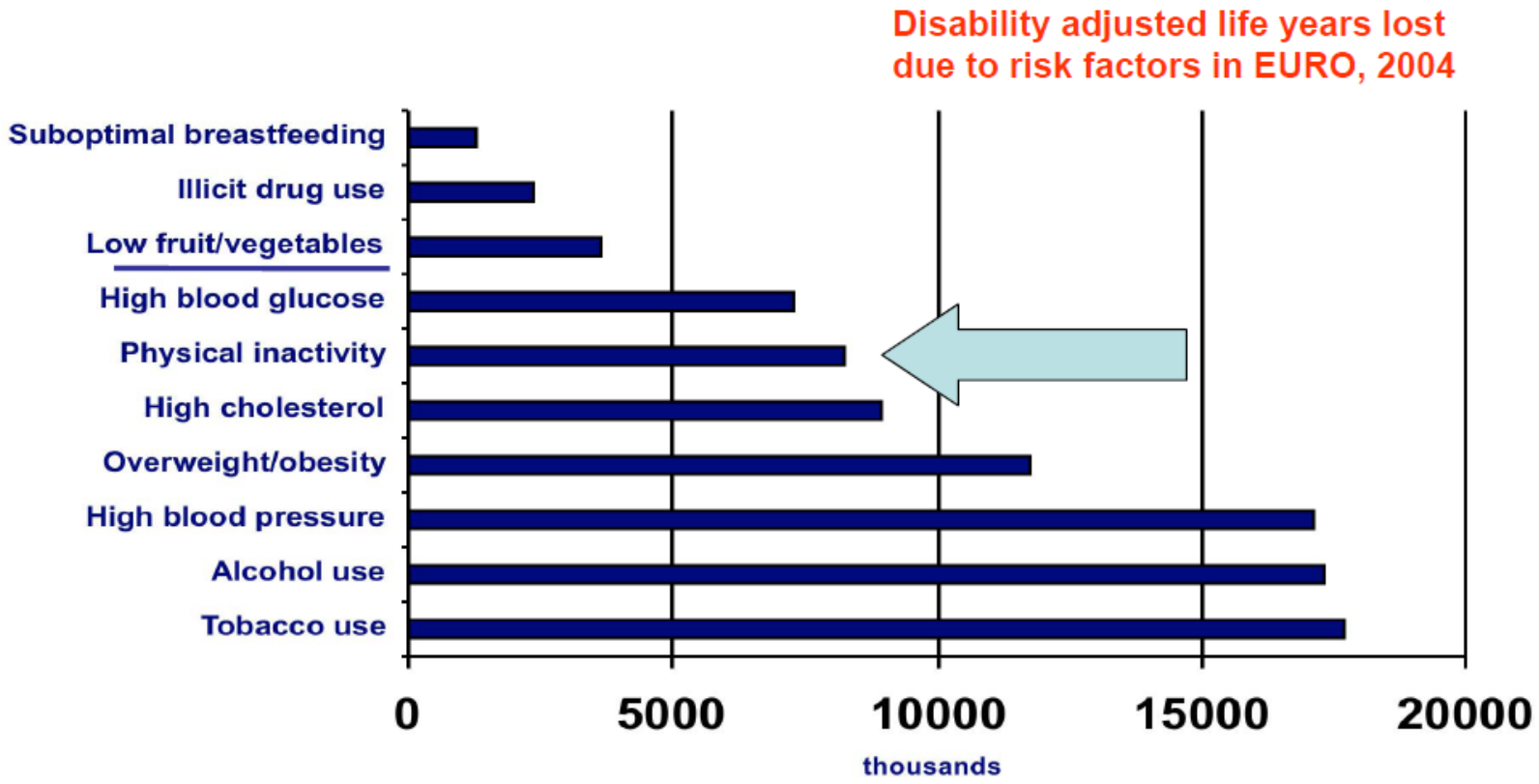
# Cycling and the health of the nation

Dr Adrian Davis FFPH
Visiting Professor of Transport & Health

UWE BRISTOL
University of the West of England

bettertogether

# Physical inactivity is one of the leading risk factors for health in Europe, associated to nearly 1 million deaths/year
# Transport policies can create conditions supportive for physical activity






Source: Global Health Risks.. Geneva, World Health Organization, 2009 (http://www.who.int/healthinfo/global_burden_disease/global_health_risks/en/index.html/).

# How does physical activity produce health benefits?

- The greatest health benefits from physical activity are from its anti-inflammatory properties
- In cells - the release of free radicals from the mitochondria when sedentary causes inflammation and speeds up the ageing process
- The increased insulin sensitivity as a result of physical activity reduces cardiovascular disease, prevents diabetes and reduces the risk of cancer
- Weight loss only accounts for about 10% of the cardiovascular health benefits of physical activity

# Active Travel:
# The Miracle Cure and Preventive Medicine?



***'The potential benefits of physical activity to health are huge. If a medication existed which had a similar effect, it would be regarded as a "wonder drug" or "miracle cure".'***

***Sir Liam Donaldson – Former Chief Medical Officer***
*(Annual Report of the Chief Medical Officer 2009, Department of Health, March 2010)*

# Copenhagen Heart Study

- 3,375 women and 17,265 men aged 20-93 randomly selected from a population of 90,000 living in central Copenhagen.
- 14,976 cycled regularly to work, for about three hours per week on average. The study found that cycling has a strong protective function.
- Using self-reported assessments of health, blood pressure, cholesterol, Body Mass Index, and risk factors such as smoking, the researchers concluded that:
- "Even after adjustments for other risk factors, including leisure time activity, those who did not cycle to work experienced a 39% higher mortality rate than those who did."

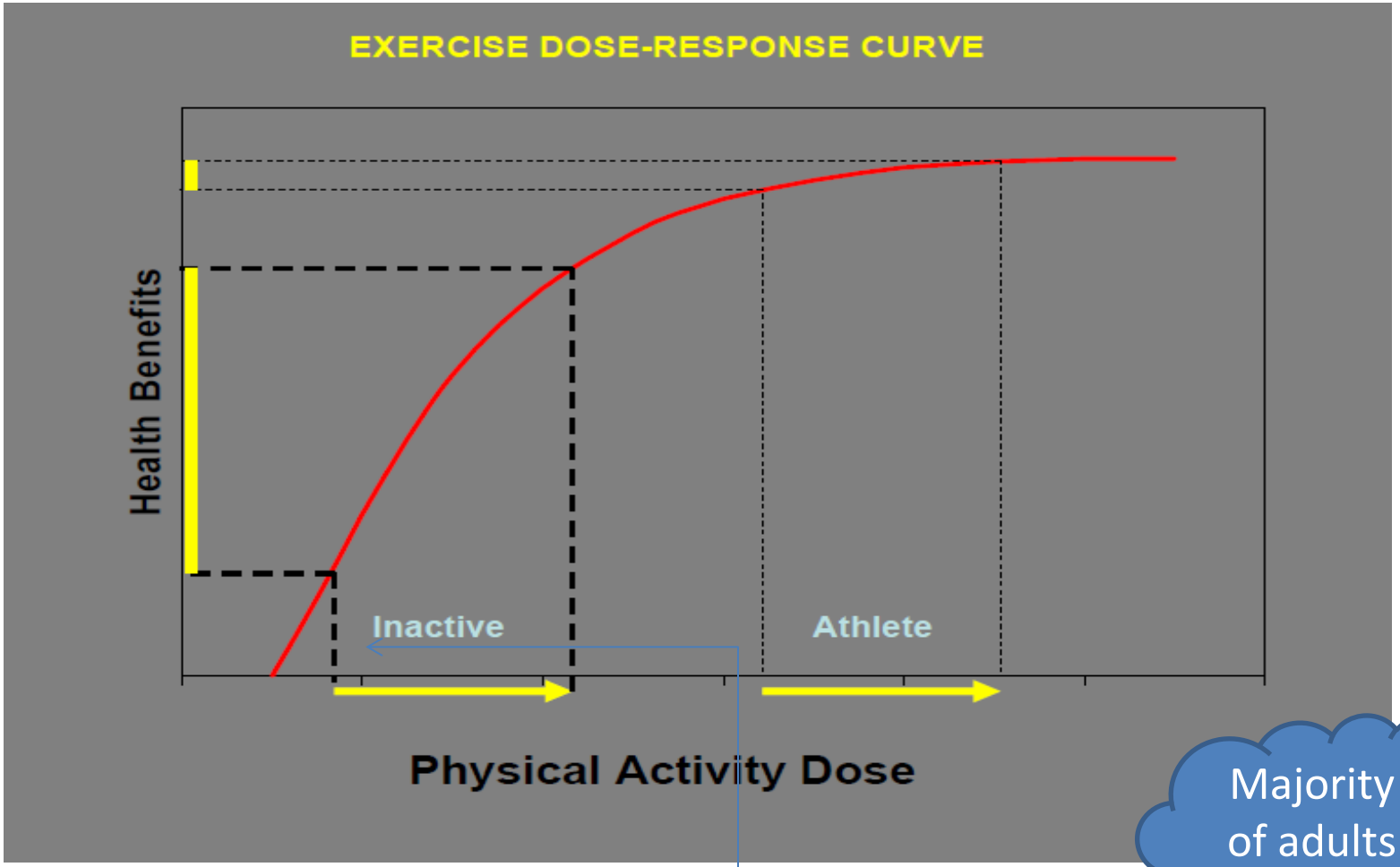

- Andersen, L, B., Schnohr, P., Schroll, M., Hein, H. 2000 All-cause mortality associated with physical activity during leisure time, work, sports, and cycling to work, Archive of Internal Medicine, 160: 1621-1628. Freely available from http://archinte.amaassn.org/cgi/search?fulltext=cycling+to+work

# Cycling and workplace absenteeism

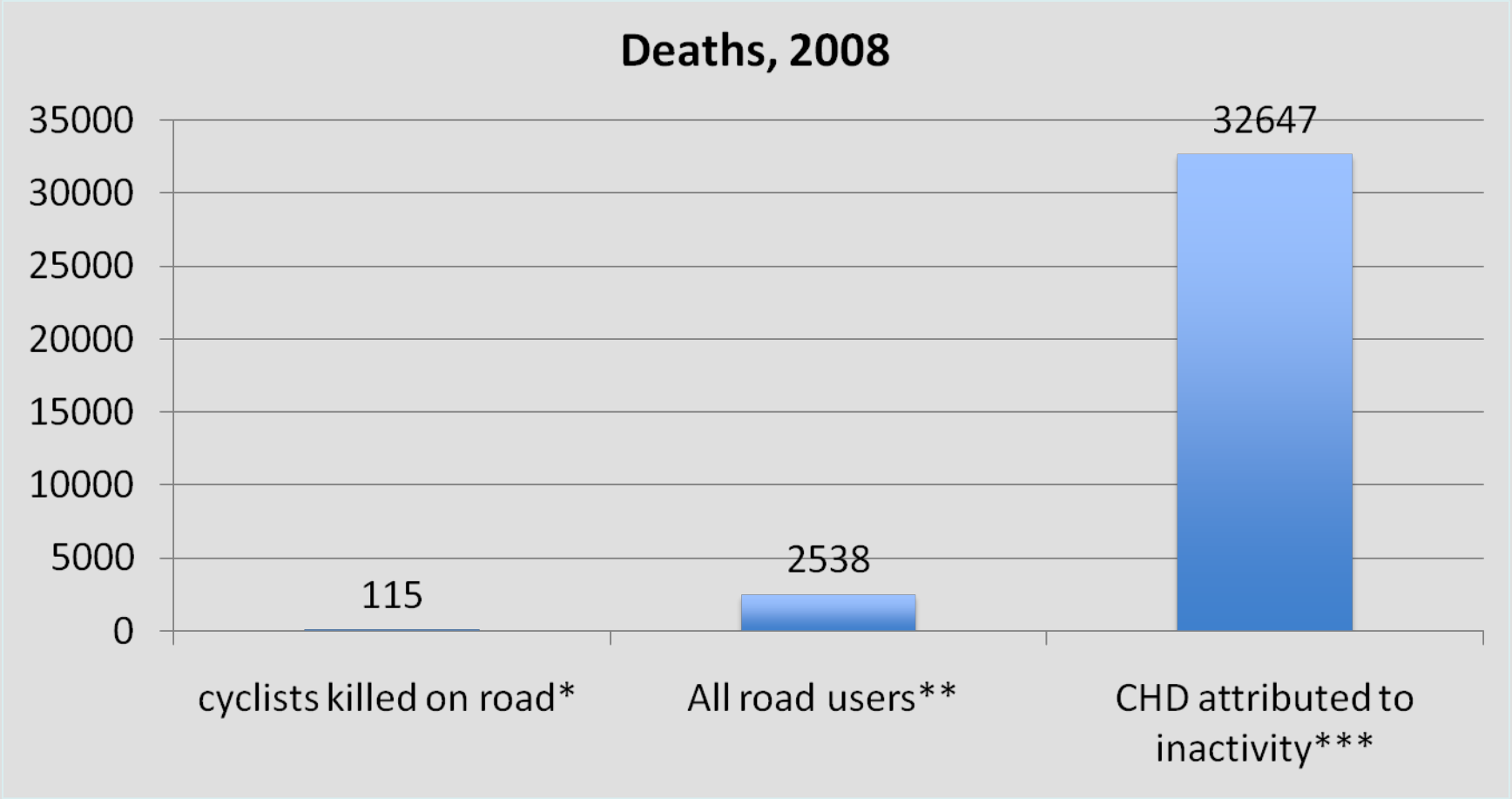
- Dutch research among employees of three major organisations conducted into commuting to work by bicycle in relation to health and work performance.
- Data on absenteeism of the respondents were provided by the employers, 1236 employees, 64% cycled to work regularly, and 36% did not cycle at all.
- Regular commuters missed significantly fewer days a year than non-cyclists: on average 7.4 days a year (cyclists) compared to 8.7 days a year (non-cyclists).
- There was also a relationship between distance, commute frequency and degree of absenteeism: the more often and the greater the distance, the lower the absenteeism.


- http://www.tno.nl/downloads/KvL-L.09-01.971Nm_laag%20DEF.pdf (In Dutch) accessed 6th March 2009.

# Dose response curve: physical activity



# The risk of physical inactivity compared to road casualties




Source: * **DfT Road Traffic Casualties 2009 *** BHF statistics 2010 edition; McPherson et al 2002.


Cycling & Health
What's the evidence?
https://ciltuk.org.uk/Portals/0/Documents/The%20Hub/policy/Cycling_Health_Full_Report.pdf?ver=2015-04-07-165650-663
cycling england
Nick Cavill & Dr Adrian Davis
Public health advisors to Cycling England

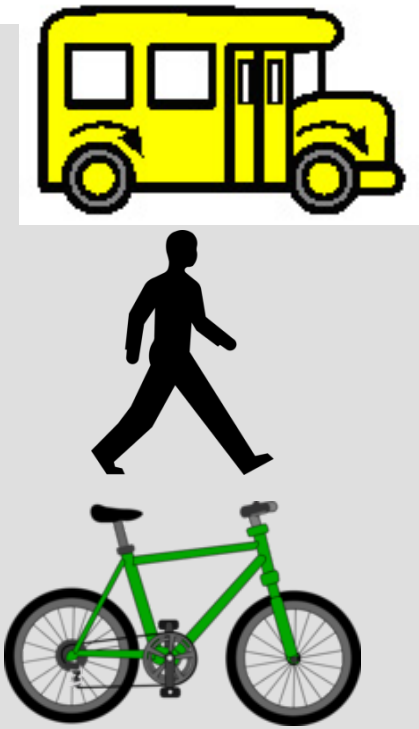
# Change in commute mode and body-mass index: prospective, longitudinal evidence from UK Biobank

*Ellen Flint, Elizabeth Webb, Steven Cummins*



**BMI: -0.30 kg/m2**

**BMI: + 0.32 kg/m2**



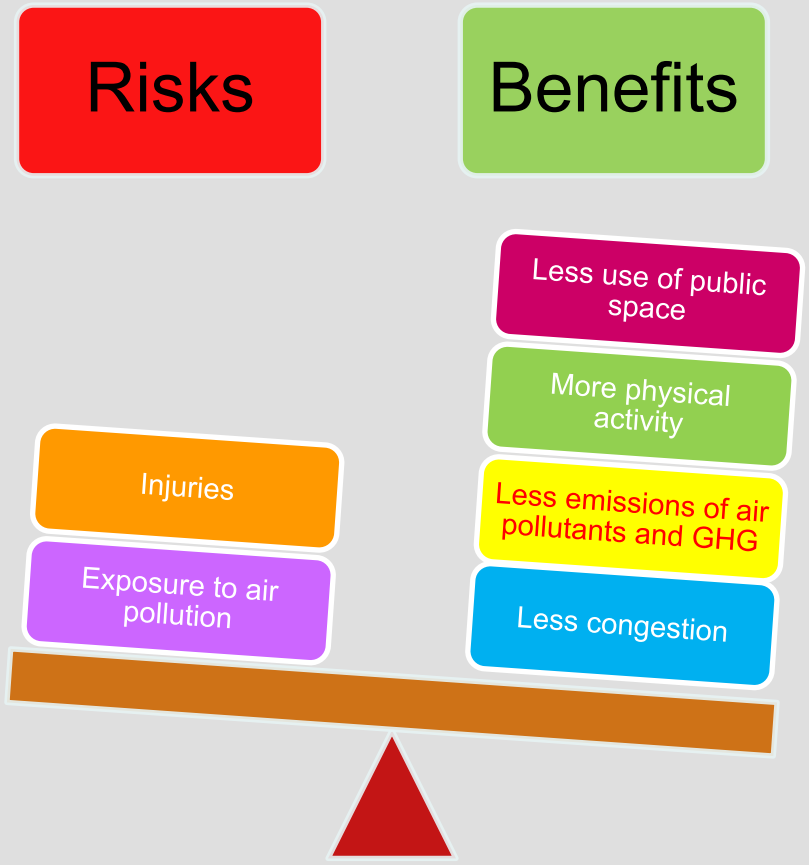
www.thelancet.com/public-health Published online October 28, 2016
http://dx.doi.org/10.1016/S2468-2667(16)30006-8

# Impact of car use on body weight

- In China, adults who bought private motorised transport to travel to work doubled their likelihood of becoming overweight in comparison to those where there was no mode change 1
- Countries with highest levels of active travel  generally have the lowest obesity rates 2


- 1. Bell, C., e, K., Popkin, B. 2002 The road to obesity or the path to prevention: motorised transportation and obesity in China, *Obesity Research*, 10(4): 277-283.
- 2 Bassett, D., Pucher, J., Buehler, R., Thompson, D., Crouter, S. 2008 Walking, cycling, and obesity rates in Europe, North America and Australia, *Journal of Physical Activity and Health*, 5: 795-814.

# A rapidly developing evidence-base



# Regular cycling or walking reduces all-cause mortality by ca. 10 %

Kelly *et al. International Journal of Behavioral Nutrition and Physical Activity* 2014, **11**:132
http://www.ijbnpa.org/content/11/1/132

International Journal of Behavioral Nutrition and Physical Activity

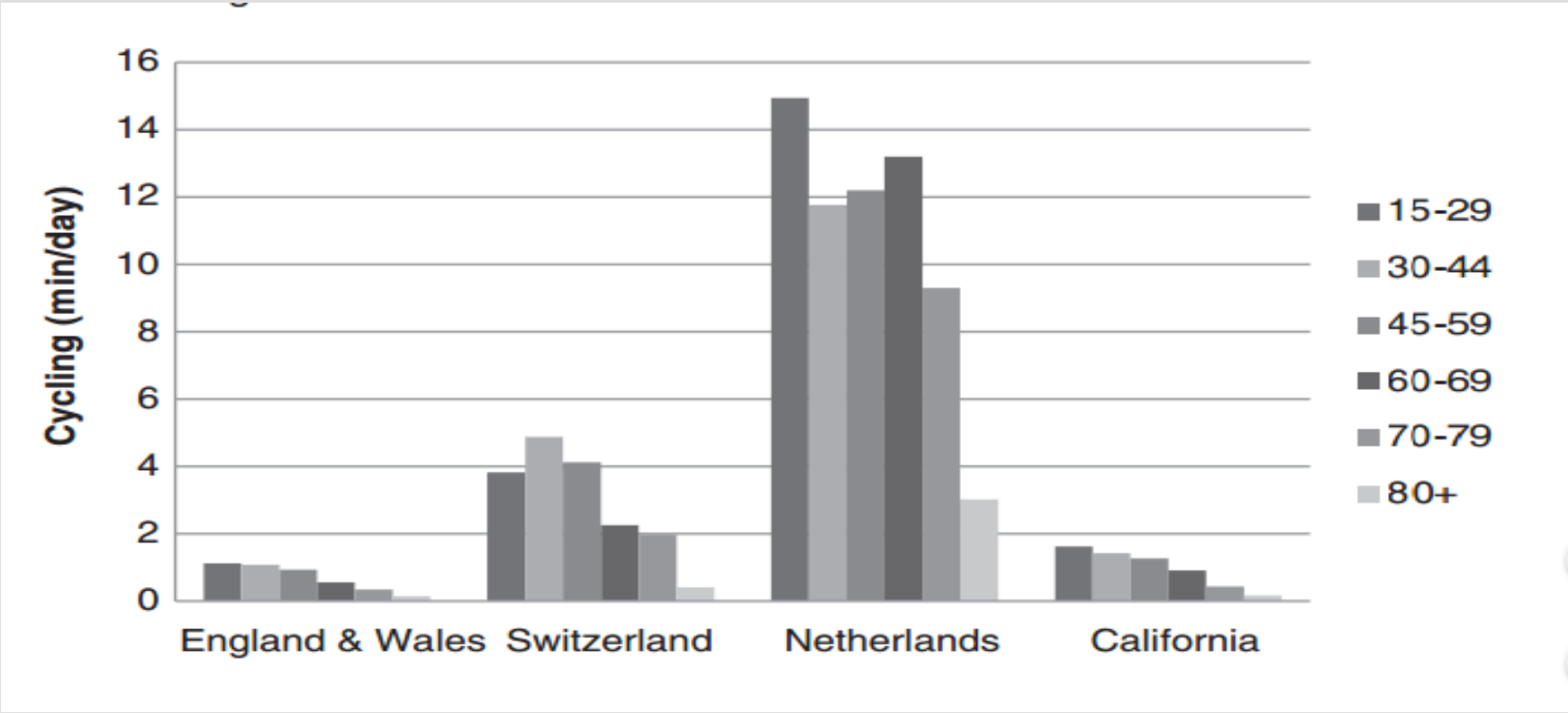
RESEARCH Open Access

## Systematic review and meta-analysis of reduction in all-cause mortality from walking and cycling and shape of dose response relationship

Paul Kelly[1,2*], Sonja Kahlmeier[3], Thomas Götschi[3], Nicola Orsini[4], Justin Richards[5], Nia Roberts[6], Peter Scarborough[1] and Charlie Foster[1]

http://www.biomedcentral.com/content/pdf/s12966-014-0132-x.pdf

# In countries with supportive policies and infrastructures, active mobility can contribute significantly to achieving the recommended levels of physical activity




Age distribution of cycling. The data is population based including people who did not travel

Source: T. Götschi et al. / Preventive Medicine 74 (2015) 42–48
http://dx.doi.org/10.1016/j.ypmed.2015.02.009

# Benefits and risks: modeling

Transport Policy 19 (2012) 121–131

Contents lists available at SciVerse ScienceDirect

Transport Policy

journal homepage: www.elsevier.com/locate/tranpol

## Benefits of shift from car to active transport

Ari Rabl [a,*], Audrey de Nazelle [b]

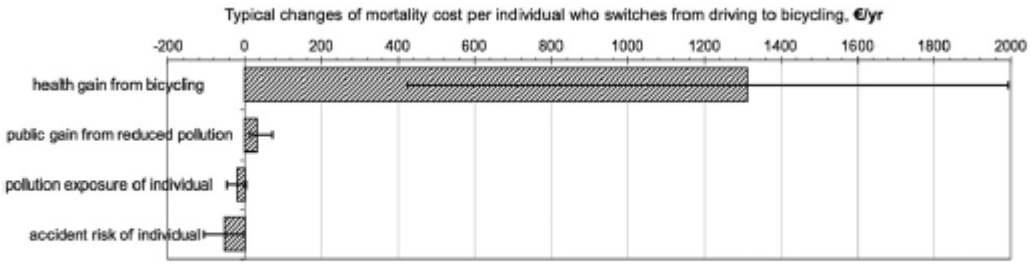
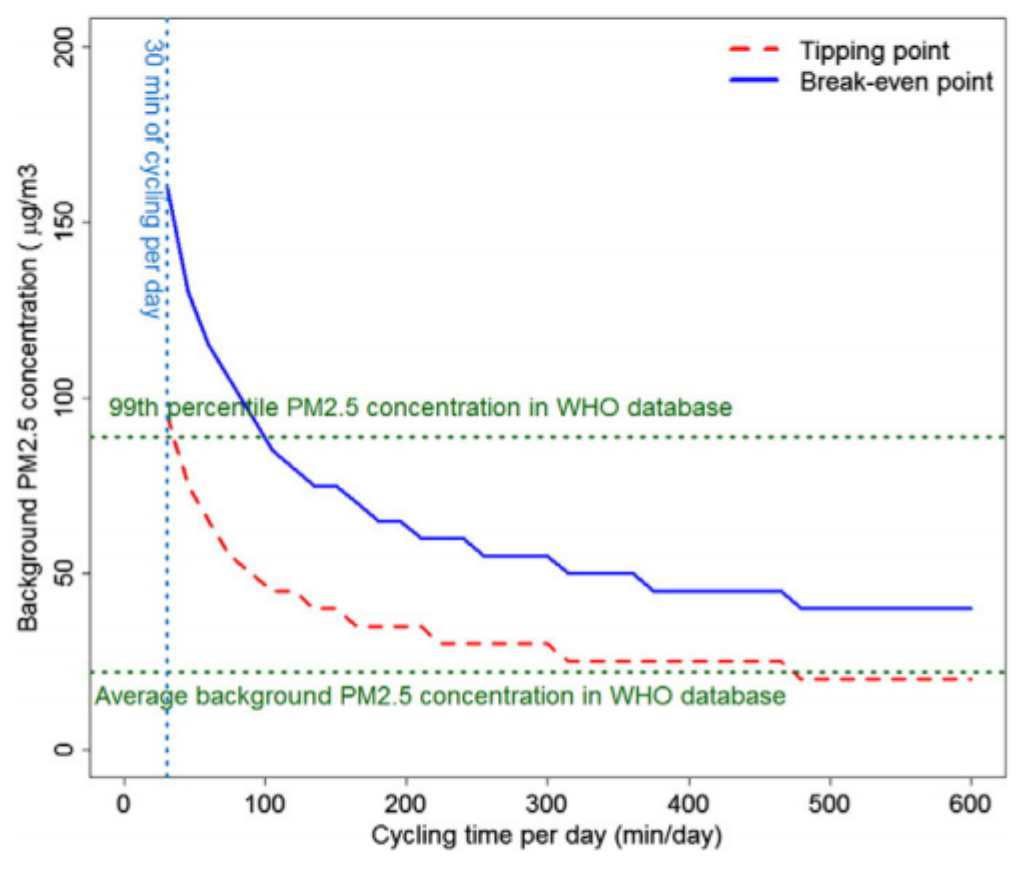



**Fig. 2.** Results for mortality costs and benefits per individual who switches from car to bicycle for commuting to work (2∗5 km roundtrip, 5∗46 weeks/yr) in large cities of EU. Error bars indicate confidence intervals.

- Physical activity 'by far' the most important health impact
- "Concern about pollution exposure…is unfounded when compared to the benefits of the cycling activity"
- Only includes premature deaths so total benefits likely to be much higher

# Physical Activity  benefits of active travel outweighed the harm caused by air pollution in all but the most extreme air pollution concentrations.




- For half an hour of cycling every day, the background PM2.5 concentration would need to be 95 µg/m3 to reach the tipping point
- The break-even point for half an hour of cycling every day was at 160 µg/m3

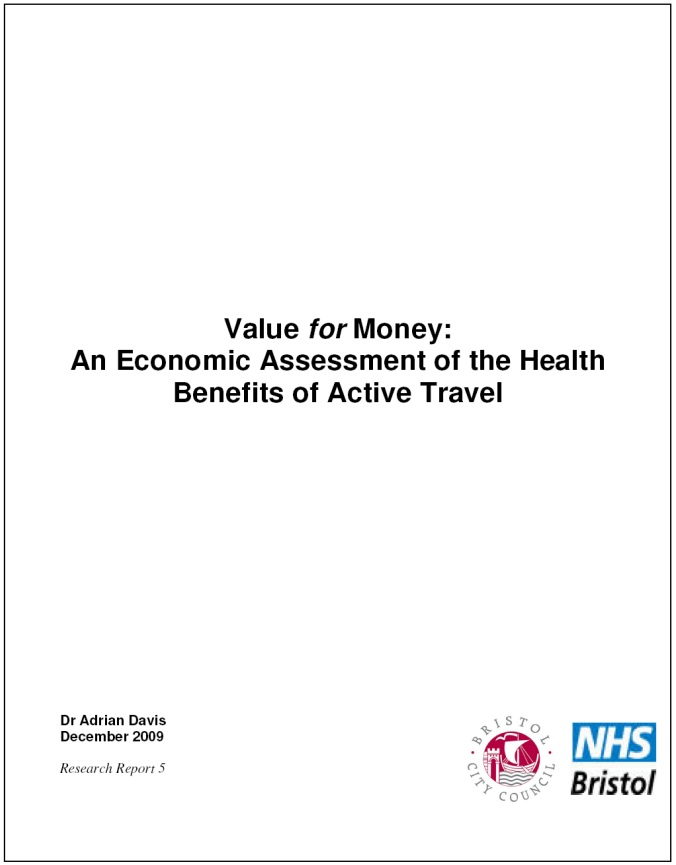
M. Tainio et al. / Preventive Medicine 87 (2016) 233–236
doi:10.1016/j.ypmed.2016.02.002

# Exploring the job creation potential of active mobility

- Up to **435,000 cycling jobs created** if 56 major cities achieved Copenhagen's cycling modal share
- Strong correlation between cycling and the number of cycling-related jobs
- Cycling jobs are not only in cities – tourism jobs across wider geographical areas
- The indirect and induced jobs related to cycling can be significant
- Methodological issues remain, and need to be addressed through further research



# What's good for health is good for the Treasury



# Different arguments for different agendas



# Co-benefits

- prevent non-communicable diseases
- reduce climate change emissions
- improve road safety
- improve air quality
- reduce noise
- social and quality of life benefits
- save public money!

# What works: NICE Recommendations

- re-allocate road space to support physically active modes of transport
- restrict motor vehicle access
- introduce road-user charging schemes
- introduce traffic-calming schemes to restrict vehicle speeds
- create safe routes to schools

# In summary:

## What facilitates action?

- "Champions"
- Goals underpinned by political support
- Evidence
- Institutional legitimacy and support
- Policy coherence across levels of government
- Shared agenda
- Tangible outcomes and products
- "Light" administrative arrangements

## What hinders action?

- Lack of political interest
- Changes in political agendas
- No obligation/sanction
- Opposing stakes
- Unpredictable funding
- Work in silos
- Difficulty in determining clear accountability
- Lack of institutional support for intersectoral work
- Lack of capacities for intersectoral work

# Bristol 2008-16:
# Some successes

UWE BRISTOL
University of the West of England

bettertogether

# A Safe Systems Approach to
# Road Safety in Bristol
## A Ten Year Plan



BRISTOL CITY COUNCIL




- Guided by Public Health, Bristol City Council ran two pilot areas of ‘signs only’ 20 mph in 2010.
- Evaluation showed that pilot 20mph areas were very popular
- Vehicle speeds reduced
- Walking and cycling use went up
- Bus reliability unchanged.

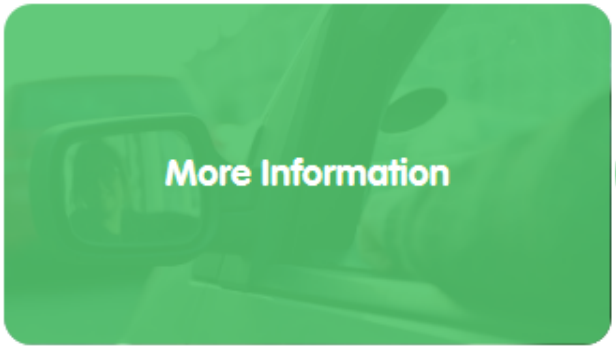
**“speeding traffic consistently came out as the antisocial behaviour perceived to be the greatest problem”**

**Poulter & McKenna (2006)**

Safety
Public Policies
Health Effects

# Safety Essential Evidence




**04.01.2016** 01:51 pm

142: Kinetic Energy Management, Haddon's Matrix, and Road Safety

**16.05.2014** 01:26 pm

121: School based driver education for the prevention of crashes: Evidence and policy



**27.03.2014** 01:23 pm

118: Car manufacturers and global



**12.03.2014** 01:20 pm

117: Can society address social



EN 08:48 24/02/2016

- **Thank you**

1. adrian.davis@uwe.ac.uk
2. www.elsevier.com/locate/jth
3. www.travelwest.info/evidence